Dec. 1, 1970 T. D. SHARPLES 3,544,139

PRECISION QUICK CONNECTION

Filed April 11, 1969

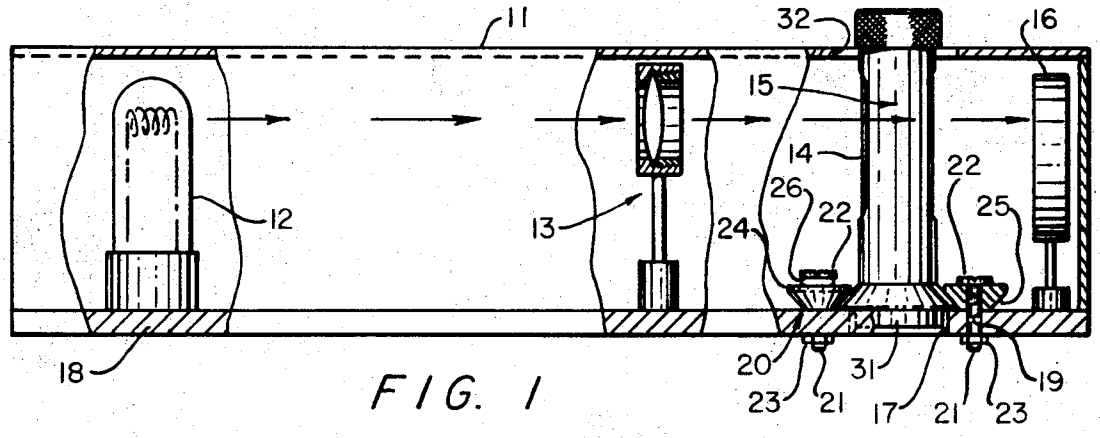


FIG. 1

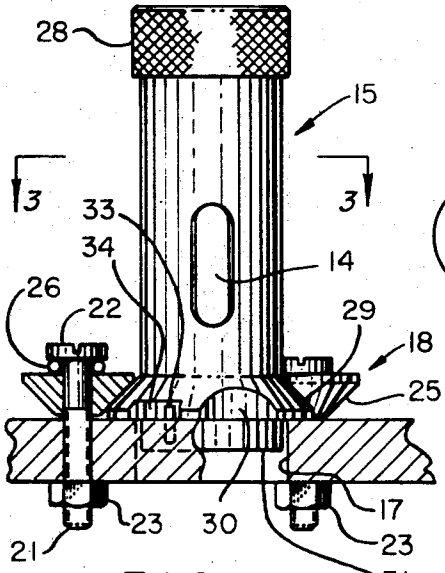


FIG. 2

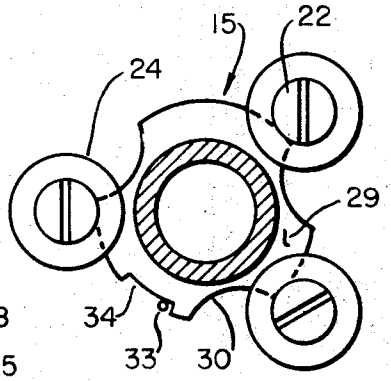


FIG. 3

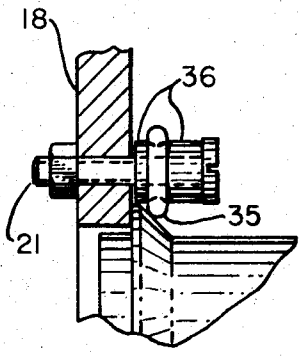


FIG. 4

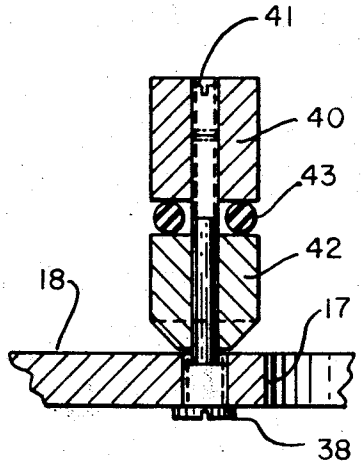


FIG. 5

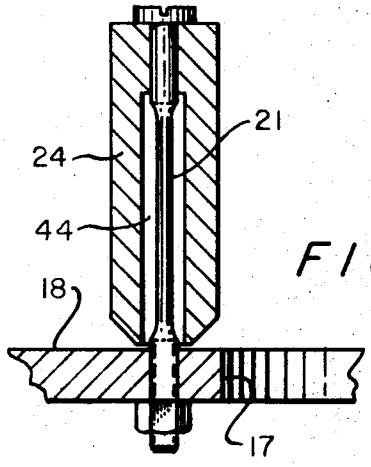


FIG. 6

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United States Patent Office 3,544,139 Patented Dec. 1, 1970

3,544,139

PRECISION QUICK CONNECTION

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Filed Apr. 11, 1969, Ser. No. 815,420
Int. Cl. F16b 9/00
U.S. Cl. 287—20 8 Claims

ABSTRACT OF THE DISCLOSURE

An attaching device for readily detachably mounting a body, such as a cuvette, to a plate with repeatable axial precision. A plurality of roller assemblies, at least one of which is resilient, are carried by the plate. The cuvette surface contains recesses for clearing the rollers when seating the body. When the seated body is turned, the roller assemblies press the body toward the plate and the resilient roller assembly laterally urges the body toward the other of the roller assemblies.

BACKGROUND OF THE INVENTION

This invention relates generally to a device for readily detachably mounting a body to a plate with precision.

SUMMARY OF THE INVENTION AND OBJECTS

According to the invention, an attaching device for readily detachably mounting a body to a plate with repeatable axial precision is provided. At least three spaced, non-aligned support posts are formed with rotatable, enlarged upper portions, and carried by the plate. The body periphery includes clearance recesses to permit passage of the upper post portions when seating the body among the posts. The body also includes surface portions, suitably of a frustoconical shape, which serve to cooperate with the upper post portions to press the body tightly toward the plate after relative rotation therebetween with the body seated among the posts. At least one of the posts is resilient, thus serving to laterally urge the axis of rotation of the body toward the other of the posts when the body is in the above tightly pressed position. The support posts are suitably formed from axles, mounted on the plate, serving to carry a roller device.

It is an object of the invention to provide an improved attaching device for mounting a body to a plate.

It is a further object of the invention to provide an improved attaching device for readily detachably mounting a body to a plate with repeatable axial precision.

It is a further object of the invention to provide an improved attaching device for readily engaging and disengaging a body and a plate

Further objects of the invention will be apparent from the description which follows taken in conjunction with the drawings appended thereto.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a partially schematic, cut-away, elevational view of a monitor apparatus with a cuvette mounted thereto by the attaching device of the invention.

FIG. 2 is an enlarged elevational view of one embodiment of the attaching device of the invention.

FIG. 3 is a top sectional view taken along the line 3—3 of FIG. 2.

FIGS. 4, 5 and 6 are enlarged views of three different embodiments of the axle and roller device.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, a housing **11** is provided to house the working parts of an ultra-violet monitor. In the operation of the monitor, light from a light source **12** passes

a condenser lens **13** which serves to focus the light on window **14** of cuvette **15**. The light is received by photocell **16** which provides an electrical signal indicative of the contents of the cuvette.

The base plate **18** of housing **11** includes a hole **17** surrounded by three spaced, non-aligned, tapped holes **19** for receiving roller assemblies **20**. The roller assemblies include three axle bolts **21** having flat heads **22**, only two of the axles being shown in FIGS. 1 and 2. Axles **21** are threadably received in tapped holes **19** and may be suitably locked to plate **18** by nuts **23**. Rollers **24** are slidably and rotatably carried by axles **21**. Rollers **24** may have frustoconical under-surfaces **25**.

Between one of rollers **24** and the flat head **22** of its supporting axle **21** is inserted a resilient member such as O-ring **26** serving to resiliently urge the roller toward plate **18**. O-ring **26** may be formed of any suitable resilient material, such as rubber. Such a combination will be referred to hereinafter as a resilient roller assembly.

Cuvette **15** may be provided with a suitable top for convenient manual handling and turning such as knurled top **28**. A lower portion of the periphery of cuvette **15** may be formed into a frustoconical ring **29** adapted to mate with under-surface **25** of rollers **24**. Surface **29** contains suitable clearance recesses, such as notches **30**, spaced to cooperate with rollers **24** to permit cuvette ring **29** to clear the rollers **24** so that the cuvette may be seated with bottom **31** in hole **17** and the flat portion of ring **29** seated on plate **18**. An opening **32** is provided in housing **11** to allow the cuvette **14** to be slidingly inserted therein.

A stop pin **33** may be secured to plate **18** to extend upwardly therefrom. Pin **33** cooperates with a notch **34** in ring **29** to provide a precise angular positioning of cuvette **15** on plates. The pin **33** contacts an edge of notch **34** when the cuvette is in the predetermined angular position, hereinafter called the "set" position. The insertion and turning of cuvette **14** may be performed manually with top **28**.

In the set position, cuvette **15** is pressed toward plate **18** by the roller assemblies **26**. The resilient roller assembly serve to laterally urge the axis of rotation of cuvette **15** toward the other two of the rollers to provide a repeatable precise axial location for the cuvette. The axial location or position may be adjusted by tightening or loosening the bolts **22** associated with the two rollers. When such precision is unnecessary or when other locating means such as piloting diameters are preferred, all three roller assemblies may be resilient to more tightly press the cuvette **15** against plate **18**.

Since the rollers **24** are free to rotate upon a turning of the cuvette **15**, the wear on the rollers and ring **29** is at a minimum. Thus, the contacting surfaces retain their precision for long periods of time.

Like numbers for like parts will be used for the description of the resilient roller assemblies of FIGS. 4, 5 and 6 to be described hereinafter.

Referring to FIG. 4, another embodiment of a resilient roller assembly includes a hub **35** formed of a resilient material, such as an elastomer. Hub **35** is suitably retained on axle **21** by washers **36** in a position to contact surface **29** and press the cuvette **14** to the plate **18** in cooperation with the other two roller assemblies **20** and to laterally urge the cuvette thereto.

Referring to FIG. 5, a further embodiment of the resilient roller assembly includes an axle **38** received in tapped hole **19** of plate **18** and protruding therethrough. The axle is threadably engaged with adjusting nut **40** held in a precise position by locking screw **41**. Roller **42**, carried by axle **38**, is provided with resilience by means of O-ring **43** inserted between screw **40** and the roller. The O-ring may be made of any resilient material such as

rubber. The elongated assembly cooperates with the clearance recesses to guide the cuvette into position for turning and positioning.

Referring to FIG. 6, a further embodiment of the resilient roller assembly includes an elongated axle **21** and elongated roller **24**. The resilience of the roller assembly is provided by flexure of the axle. An increase in flexure, hence resilience, may be accomplished by providing a long annular space **44** between the axle and the roller. As in the embodiment of FIG. 5, the elongated roller cooperates with the clearance recesses to guide the cuvette.

It will be apparent that the roller assemblies may be mounted on structures other than a plate adapted to hold the cuvette. Furthermore, the rollers may be disposed to cooperate with the inside of a ring rather than the outside as shown. Likewise, the rollers can be mounted in the cuvette to be positioned and the ring on the supporting structure.

It is apparent from the foregoing description that the attaching device of the invention is suitable for readily coupling and uncoupling a cuvette to an associated mount with repeatable axial and angular precision. In addition, the attaching device may be used in any apparatus wherein ready interchangeability of parts is desirable. Thus, it is particularly well suited where the part must be attached with repeatable axial precision, such as in lens, mirror and prism mounts of optical instruments.

I claim:

1. In an attaching device for readily detachably mounting a body to a planar support with repeatable axial precision, the combination comprising:

at least three spaced, parallel non-aligned posts formed with rotatable, enlarged upper portions, and extending from one side of said support

a ring including clearance notches formed on the periphery thereof to permit simultaneous passage therethrough of said upper post portions when seating the body on said support, said ring further including surface portions serving to cooperate with said posts to press the body tightly toward the plate upon rotation of said body after seating, and

resilient means carried by at least one of said posts serving to laterally urge the axis of rotation of the body toward the others of said posts upon rotation of said seated body relative to the support.

2. A combination as in claim **1** wherein said posts comprise axles secured to the support and roller means carried by the axles, said roller means forming said upper post portions.

3. A combination as in claim **2** including means for providing a precise angular stopping position upon relative rotation between said seated body and said support.

4. In an attaching device for readily detachably mounting a body to a planar support with repeatable axial precision, the combination comprising:

a plurality of at least three spaced, parallel non-aligned axles mounted on one side of the support,

roller means carried by said axles,

said body including clearance recesses formed on the periphery thereof to permit passage therethrough of said roller means when seating the body among said posts, said body further including surface portions serving to cooperate with said roller means to press the body tightly toward the support upon rotation of said body after seating, and

at least one of said roller means including means serving to laterally resiliently urge the axis of rotation of the body toward the others of said roller means upon rotation of said seated body relative to the support.

5. A combination as in claim **4** wherein the means to resiliently urge the axis of rotation is formed of a rubber-like material.

6. A combination as in claim **4** wherein the means to resiliently urge the axis of rotation comprises a first and second annular member carried by said axle, said second member being disposed between said first member and said support, and an annular resilient member carried by said axle disposed between said first and second members.

7. A combination as in claim **4** wherein said roller means and corresponding axle are elongated to resiliently urge the roller means by flexure of the axle.

8. In an attaching device for readily detachably mounting a body to a support with repeatable axial precision, the combination comprising:

a plurality of at least three spaced, non-aligned axles mounted on the plate,

roller means carried by one of the axles,

said body having a ring having a frustoconical surface formed on the periphery thereof, said surface including clearance recesses to permit passage therethrough of said roller means when seating the body among said axles, said seated body cooperating with said roller means to press the body tightly toward the support upon rotation of said body after seating, and

at least one of said roller means serving to resiliently urge the axis of rotation of the body toward the others of said roller means upon rotation of said seated body relative to the support.

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U.S. Cl. X.R.

248—223